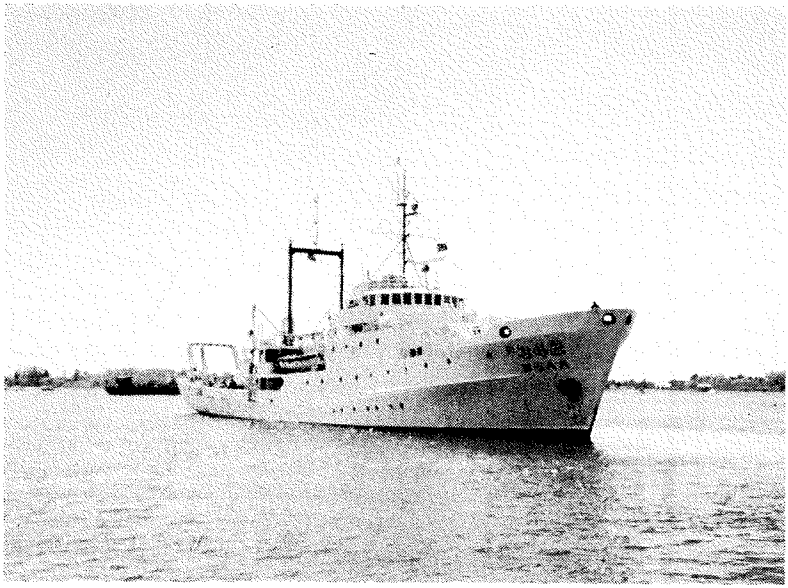
United States Department of Commerce

National Oceanic and Atmospheric Administration



Albatross IV

Albatross IV

The ship *Albatross IV* is a research vessel owned and operated by the National Oceanic and Atmospheric Administration (NOAA) of the United States Department of Commerce.

Built in 1962, by the Southern Shipbuilding Corporation of Slidell, Louisiana, the *Albatross IV* was designed to meet the operational requirements developed by the staff at the Bureau of Commercial Fisheries (now National Marine Fisheries Service) biological lab at Woods Hole, Massachusetts, in 1960. Its mission then, as it remains today, is to conduct fisheries and oceanographic research in the Northwest Atlantic Ocean. She is especially equipped to collect information on the distribution and abundance of groundfish and sea scallops as well as on environmental factors which affect seasonal and long-term changes in fish stocks. In addition, the *Albatross IV* is equipped to study organisms which form the food supply of groundfish, and to investigate plankton populations and oceanographic conditions.

The after part of the main deck is the main working area. Here is where all of the various kinds of gear are lowered into the sea and recovered. There is a stern ramp for hauling nets and other gear aboard. Sheaves for carrying trawl warps and other lines are suspended from a movable gantry which can be rotated hydraulically and will lift 10,000 pounds. Its main function is to handle the otter trawl, mid-water trawl, and heavy dredges.

The double-drum main trawl winch is located on the lower deck. Each drum holds 6000 feet of 7/8-inch diameter cable with level winding gear which can be converted for other sizes of wire. The drum is driven through a reduction gear by a 125 h.p. electric motor to develop a stalled line pull of 30,000 pounds on both warps. From the winch the warps run forward to a pair of sheaves on the deck. They then run up through the overhead to a pair of sheaves on the main deck and aft to the towing blocks just inside the throat of the gantry. The warp from the dredging winch, with 4000 feet of 5/8-inch cable, is led in a similar manner along the mid-line of the vessel.

The main boom is set on the mid-line of the ship at the forward end of the fishing deck. It will lift 10,000 pounds at a 34-foot radius and has two sets of falls, each with its own winch.

The control station for the main trawl winch, dredging winch, the main boom vangs, and the two falls winches on the boom is located at the after end of the boat deck just to starboard of the center line. From here, the winch operator has a clear view of the entire fishing deck.

A major effort was made in the arrangement of the laboratory spaces, not only to provide good communications with the rest of the ship, but also to keep them separate from the traffic of people engaged in other aspects of the ship's business. As little of the furniture and equipment as possible is permanently fastened to the ship's structure so as to permit easy rearrangement to meet the needs of each scientific mission.

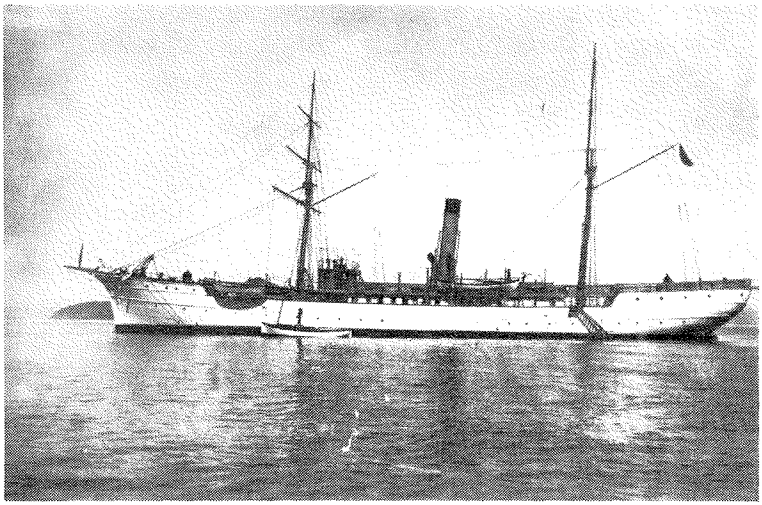
The pilot house is about a third of the length of the ship from the bow one deck above the boat deck. It is completely equipped with modern controls and aids to navigation. The helmsman, looking forward, can see all necessary indicators and reach all controls. The officer on watch can go aft to a station just above the winch operator and observe operations on the fishing deck.

One of the great problems of oceanographic research vessels is holding station and maintaining vertical wire angle. On this vessel this is accomplished through the use of a controllable pitch propeller provided with a Kort-type nozzle rudder and a bow thruster.

The bow thruster is a 36-inch, symmetrical propeller driven through bevel gears by a reversible 125 h.p. electric motor. It operates in a traverse, circular duct with its center about seven feet below the water line and nine feet from the stem. The increased maneuverability is advantageous in docking and undocking as well as in station keeping.

Earlier Albatross'

The First *Albatross*



The *Albatross IV* perpetuates an illustrious name among research vessels starting with the steamer *Albatross* of the United States Commission of Fish and Fisheries. In the year 1881, at the suggestion of Commissioner Spencer Fullerton Baird, Congress authorized an appropriation totaling $148,000 for the construction of the vessel. Plans were drawn by Charles W. Copeland of New York and a contract for construction was awarded to Pusey & Jones of Wilmington, Delaware. The keel was laid in March 1882, the ship was launched in August, and she made her trial run on December 30.

"Thus began the long career of the United States Fish Commission steamer *Albatross*, the first vessel built especially for marine research by any government. During her forty years of service she surveyed the Newfoundland Banks, the Bering Sea, visited scattered archipelagoes of the Pacific, and served in two wars." (Hedgpeth, 1945, *American Neptune,* vol. 5).

The *Albatross* was an iron twin-screw vessel propelled by two independent two-cylinder steam engines designed by Mr. Copeland and built by Pusey and Jones. Each engine developed about 200 net shaft horsepower delivered independently to each of the screws which were nine feet in diameter and constructed of cast iron. Steam was generated by two coal-stoked boilers which were placed fore and aft in the hold of the vessel. The vessel had a cruising speed of somewhat under 10 knots and consumed a little over 100 pounds of coal per mile at this speed.

The *Albatross* was also rigged as a brigantine and carried the following sails: mainsail, gaff-topsail, foresail, fore trysail, foretop-sail, foretop-gallant sail, fore staysail, jib, and flying jib. Her total sail area was 7,521 square feet.

Her hull statistics were as follows:

Length over all	234′
Length at 12-foot water line	200′
Breadth of beam, moulded	27′6″
Depth from top of floor to top of deck beams	16′9″
Sheer forward	3′
Height of deck-house amidships	7′3″
Displacement on 12-foot water line	1074 tons
Registered tonnage (net)	384 tons

The vessel was provided throughout with electric lights—it is said that it was the first government vessel to be so equipped. The dynamo was designed by Mr. Edison who selected a particularly fine steam engine manufactured by Armington & Sims of Providence, Rhode Island, to drive it. The dynamo generated 51 volts and a current for 120 lamps.

Edison electric lamps also were used for underwater observation of marine organisms at night and for attracting fish and other animals to night light stations. The deep-sea cable used for the light was 940 feet long.

The vessel was especially designed for dredging and the collection of bottom samples and animals at all depths. She had two well equipped large laboratories for the preservation and study of biological materials and the chemical analyses of water samples. One laboratory on the main deck was 14 feet long and

occupied the entire width of the deck house. Another laboratory on the deck below was 20 feet long and equipped with a photographic darkroom and a chemical laboratory.

The *Albatross* carried five boats: a Herreshoff Steam Cutter, a steam gig, a seine boat, a whale boat, and a dinghy. The 26-foot cutter seated eight people, was powered with a 16-horse-power steam engine, and could make eigth knots, but it was also provided with sliding gunter masts and sails, schooner rigged. Her bunkers held 1000 pounds of coal.

The steam gig was 25 feet long, powered with 7-1/2 horse power engine and was generally lighter than the cutter. It had a speed of seven knots and seated seven persons. A peculiar feature of the boat was the location of the propeller under the bottom, about half the length from the stern. This prevented racing in heavy seas and made her performance in a sea-way remarkable.

The seine boat was designed especially for mackerel seining. It was 38 feet long, pulled eight oars, and was schooner rigged with sliding gunter masts. The whale boat was 26 feet long, pulled six oars, and was also schooner rigged with gunter masts. The dinghy was 18 feet long, pulled three pairs of sculls, and was rigged with a split lug sail.

Since the *Albatross* was especially designed for deep-sea dredging, the dredging equipment was one of her most interesting features. She carried 4,500 fathoms of 3/8-inch galvanized wire rope. The main dredging winch was on the main deck, but the wire was stored on a reel on the deck below. The wire rope from the dredge passed over the dredging block at the end of the dredging boom, then under a sheave in the heel of the boom, then upward and over a block suspended from a special rubber accumulator, and then to the central gypsy head of the main dredging winch.

After leaving the dredging winch the wire was passed below deck and lead under a governor, then to a leading block forward of the storage winch, and finally back to the reel of this winch. Through the action of the governor, uniform tension was

maintained on the rope, compensating for the surging on the dredging winch. A level wind distributed the rope evenly on the storage reel.

Deep soundings were made with a Sigsbee Sounding Machine powered by a Bacon one-cylinder steam engine. It could reel in the sounding wire at the rate of 100 fathoms per minute. A Tanner sounding machine was used in depths of less than 200 fathoms and for navigational purposes.

Subsurface samples of water were collected with a Sigsbee water bottle (then called a water-specimen cup) and an improved bottle invented by Kidder, Flint, and Tanner. Temperatures were taken with Negretti and Zambra deep-sea thermometers. Sea water densities were measured by Helgard's ocean salinometer.

The *Albatross* was built as a result of discoveries made by the Fish Commission vessel *Fish Hawk* in New England waters and the first five years of the *Albatross*' investigations were confined to the waters of the Atlantic Shelf from Cape Hatteras to Newfoundland. After the trial runs in the winter of 1882-83 she made her first scientific cruise in the summer of 1883 from April to November, running from Washington to Woods Hole and return, but investigating the fishes and bottom in a wide area of the coastal shelf and Gulf Stream. On this cruise she began amassing what was destined to become one of the greatest collections of marine organisms ever made by a single vessel. Innumerable publications have appeared based on the collections of this pioneer vessel.

From 1884 to 1887 she continued work in the Northwest Atlantic and in the Caribbean, making intensive dredging surveys and hydrographic stations. In March 1887 she was sent to the Pacific to investigate the fisheries of Alaska. She worked in these waters for three years investigating the fishery resources and fishing grounds of the Northeastern Pacific and Bering Sea, and in conducting hydrographic work. She was assigned particularly to the study of salmon, the Pribilof Islands' seal herds, and halibut.

In 1891 the *Albatross* made a special expedition to the tropical Pacific off the west coast of Mexico, Central America, and the Galapagos Islands under the direction of Alexander Agassiz of Harvard University. Many of the collections of this and later cruises under Professor Agassiz's direction were deposited in the Museum of Comparative Zoology of Harvard University.

That same winter she surveyed the ocean bottom between San Francisco and Hawaii to determine the best route for a submarine telegraph cable to the Islands. For the next several years she was occupied with Alaskan fishery investigations including continued study of the Pribilof Islands' fur seals, studying their pelagic life as well as the rookeries on the islands. She even became involved in enforcement work after the fur seals came under international regulations.

Interspersed with the Alaskan duties were numerous biological surveys conducted in various areas of the west coast of the Americas: a survey of San Diego Bay in 1894, Puget Sound salmon fisheries in 1896-97, halibut surveys, and a systematic survey of all salmon streams in 1897.

In 1898, during the war with Spain, she was detailed to the Navy. Her dredging and collecting equipment was stored in Mare Island Navy Yard and alterations made to her deck house and bunkers.

The second Agassiz-*Albatross* expedition was conducted in 1899-1900. During this cruise the *Albatross* made collections over a wide area of the South Seas and Japan, adding enormously to our knowledge of the flora and fauna of the Pacific.

In the period 1900-04, surveys were made along the West Coast, in Hawaii, and Mexico under the direction of a number of scientists from Stanford University and the University of California, including David Starr Jordan, Barton Warren Evermann, Walter K. Fisher, Harold Heath, and C. A. Kofoid.

The third Agassiz expedition (1904-05) took a number of scientists down the west coast of South America to Galapagos, Easter, and Gambier Islands.

In 1907-10 the *Albatross* made her famous Philippine expedition which resulted in a wealth of information on the fishery and aquatic resources of these fascinating islands. This expedition was under the personal direction of Hugh M. Smith, Deputy Commissioner of Fisheries. F.M. Chamberlain was naturalist on board. Others in the scientific party included such well known biologists as H.C. Fasset, Lewis L. Radcliffe, Paul Bartch, Albert L. Barrows, Alvin Seale, and Roy Chapman Andrews.

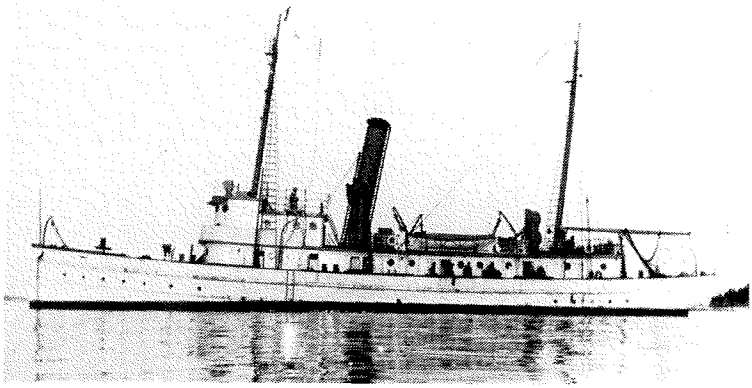
After this great expedition the vessel returned to Alaskan studies and surveys of the West Coast. During the years 1912-14 she made an intensive survey of San Francisco Bay which resulted in a classical monograph of the area.

From then until the First World War she continued dredging and hydrographic surveys along the West Coast. During the war years, 1917-19, she was placed under control of the Navy and transferred from the West Coast to Guantanamo, Cuba, for patrol duty in the Caribbean and Gulf of Mexico.

After the war she returned to research in the North Atlantic, having been away for over 30 years. In 1919 she worked in the Gulf of Mexico in the environs of Cuba and off the South Atlantic coast. W.W. Welch was in charge with E.P. Rankin as ship's naturalist. In 1920 she surveyed the Gulf of Maine under the direction of Henry B. Bigelow, conducting hydrographic and biological investigations. This was the last scientific trip. In 1921 she returned to Woods Hole, the center of the Commission's research in the North Atlantic, where she was decommissioned on October 29.

The vast collections in the museums of this country, and the library of scientific papers that resulted from her cruises substantiate the fame this vessel acquired in all scientific circles of the world.

The *Albatross II*



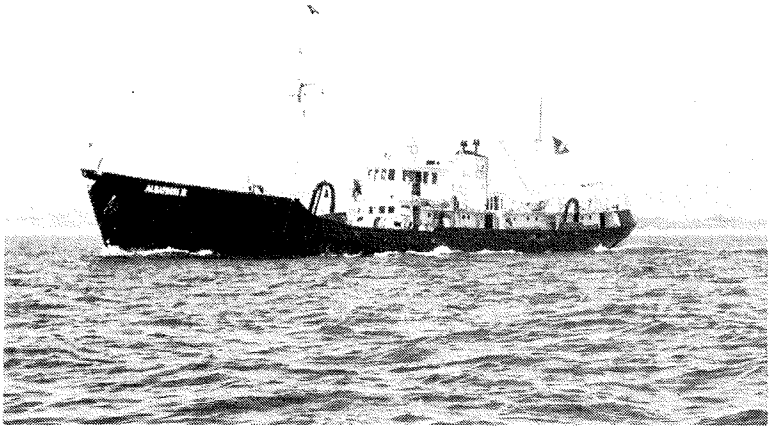
In 1926 the Bureau of Fisheries acquired from the Navy an obsolete sea tug, the *Patuxent*, for conversion to a fishery research vessel for work in the North Atlantic. This vessel which was built in 1909 was a two-masted steamer with steel hull. She weighed 521 gross tons and had an overall length of 150 feet. Her header was 29 feet 6 inches and her draft 12 feet 3 inches.

The Bureau renamed her the *Albatross II* and used her in fishery research for six years. During the First World War she had been used as a minesweeper. By the time the Bureau received her she was so antiquated that operational funds were mostly consumed by costly repairs. She was taken out of service in 1932, and returned to the Navy in 1934.

During her years in marine research, the *Albatross II* was used for surveying the New England fishing banks, and in studying the biology of some of the more valuable species. The important studies of haddock eggs and larvae by Walford, the studies of mackerel biology by Sette, and plankton research by Bigelow and Sears were based, in part, on collections made by the *Albatross II*.

Herrington conducted experiments on the vessel which were designed to test the effectiveness of large mesh nets in permitting the escape of undersized fishes through the otter trawls. This work in "savings gear" laid the foundation for further experiments which ultimately led to the mesh regulations now in force on the fishing grounds of the Northwest Atlantic.

The *Albatross III*



The *Albatross III*, like the *Albatross II*, was designed for other purposes and later converted for fishery research. The *Albatross III*, however, suffered a double conversion before she was put to the study of the sea.

Originally named the *Harvard*, she was built in 1926 as a steam trawler and fished New England waters until 1939 when she was sold by the General Seafoods Corporation to the Government for $1.00 to be converted into a fisheries research vessel. In 1942, her conversion was well under way when she was taken over by the Coast Guard to be used for patrol duty; the Second World War was in full swing and vessels were badly needed. The Navy effected an extreme conversion by lengthening the vessel from 140 feet to 179 feet overall, removing trawling gear and adding armament and other military equipment. She was then renamed the *Bellefonte*.

Toward the end of the War (in 1944) the vessel was returned to the U.S. Fish and Wildlife Service and once more was scheduled for conversion to a research vessel. This was finally accomplished in 1948 and she was commissioned at the Boston Fish Pier on March 19 of that year.

As finally converted for research work, the *Albatross III* resembled a Boston trawler although much longer than most of the fleet. She had an overall length of 179 feet, beam of 24 feet, and draft of 12 feet. Her displacement was 525 tons and cruising range 4500 miles.

She was powered with a Fairbanks-Morse seven-cylinder, 805-horsepower diesel engine. Three diesel motor-generator sets generated 140 kilowatts of 110-volt DC power. The trawl winch was electric powered carrying 600 fathoms of 7/8-inch wire on each of its two drums, permitting trawling operations in 200 fathoms of water. The deck was fitted out in the fashion of the standard Boston trawler.

The *Albatross III* was originally provided with a fish hold to carry 50,000 pounds of fish on ice as in a commercial trawler. It was planned that fish caught in research operations would be landed and sold to the credit of the vessel, thus reducing the net cost of operation. After a few cruises this plan proved impractical and was abandoned. Two freezer units, however, proved more useful. One of these provided for quick freezing and maintained a temperature of 20°F below zero; the other room held temperatures at about freezing. These were successfully used for the storage of scientific specimens, freezing replacing alcohol and formaldehyde as methods of preservation.

The laboratories were located on the main deck just aft of the trawl winch. The wet laboratory opened onto both the port and starboard decks through Dutch doors. It was fitted with a stainless steel sink in the center, suitable for handling and examining fish. Two small sinks located in the cabinets on the outside bulkheads were designed for chemical and hydrographic work. A dry laboratory or library, located aft of the wet laboratory, was provided with a large work table, chairs, bench, and shelves, and was used originally as an office for scientists for the preliminary study of data collected at sea. On later cruises it was crammed with electronic gear concerned with underwater television research.

Hydrographic booms and winches were located on the bridge deck on both the port and starboard sides. These booms featured

travelers to which the lowering blocks were attached and which regulated the distance of the lowering wire from the rail.

Living quarters provided accommodations for the ship's crew and scientific personnel. The master's stateroom was located aft of the chart room on the bridge deck. The officers', mates', and engineer's rooms were located aft of the engine room on the main and lower decks. There were four scientists' staterooms located around a wardroom on the lower deck forward of the galley and crew's mess. A stateroom for the steward and cook was located just forward of the crew's mess while the crew's quarters were in the forecastle on the lower deck. There were accommodations for a total of 35 men. Originally there was a crew of 21 men and a complement of 6 scientists, leaving 8 extra bunks available for additional scientific personnel or crew members as needed. The crew was later reduced to 18.

The *Albatross III* remained in the possession of the government for 11 years, during which time she added materially to our knowledge of the fisheries and oceanography of the Northwest Atlantic. However, her usefulness to fishery research was impaired by a chronic shortage of operational funds.

She made her first scientific cruise on May 17, 1948. For the rest of that year and until September 1949, she worked fairly consistently surveying the New England Banks, conducting experiments on the selectivity of various sizes of mesh in otter trawls, and in hydrographic-plankton work. In 1950 she was able to operate only until September. Her financial difficulties were resolved in February 1951, when she was loaned to the Woods Hole Oceanographic Institution for work under an Office of Naval Research contract. In 1952 she was operated by the U.S. Fish and Wildlife Service under a similar contract. She returned to fishery research for the period March to September 1953, after which she was tied up at the Woods Hole dock until January 1955.

At this time new funds were obtained and the *Albatross III* was placed in continuous operation until March 1959. By this time increased maintenance costs of the ageing ship, and increased operational costs forced the Bureau to bring to a close the work of the third of the *Albatross* series. She was put up for

sale under closed bids and sold to the Island Steamship Line (Joseph T. Gelinas, President) of Hyannis, Massachusetts, in November 1959.

During her active life as a fishery/oceanographic research vessel, the *Albatross III* conducted 128 cruises in the waters off New England and in adjacent areas. She contributed greatly to the study of the wise utilization of the groundfish resources of the Northwest Atlantic. Much of her work related to the program of the International Commission for the Northwest Atlantic Fisheries which was concerned with the regulation of the fisheries in this area. These great fisheries are now under regulations imposed through the action of the New England and Mid-Atlantic Fishery Management Councils, public bodies created by the Magnuson Fishery Conservation and Management Act of 1976 (200-mile-limit law).

The work of the *Albatross III* has laid the foundation for a broader and more intensive program of investigation of the fisheries of the area, developing the knowledge required for an intelligent approach to the management of the fisheries, and toward a better understanding of the relation of environmental conditions to the productivity of the area in terms of fishery resources.

Ship's General Characteristics

Length overall	187'0"
Length waterline	173'9"
Length B. P.	165'0"
Beam (moulded)	33'0"
Depth (moulded)	19'0"
Displacement tonnage	1090 tons
Draft (mean)	13'9"
Horsepower, main engines	565 each
Speed	10.5 knots
Range at speed	4300 nautical miles
Generators	three Diesel, 150 kw.; one emergency, 25 kw.
Fuel capacity	40,000 gallons
Fresh water capacity	22,000 gallons
Lube oil capacity	1,000 gallons
Accommodations	4 officers 19 crew 15 scientists